2001

What Is Critical Thinking and How Critical Thinking Improves Student Learning

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Abstract

This research paper reviews the historical perspective on critical thinking, explains the need for critical thinking instruction 'and examines the literature on the impact that critical thinking has on students' learning. However, this paper will not focus on issues related to how critical thinking might be included in the curriculum, how critical thinking can be taught effectively, or how educators can implement various critical thinking programs in their classes.

WHAT IS CRITICAL THINKING AND HOW CRITICAL THINKING IMPROVES STUDENT LEARNING

Submitted
In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

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August, 2001

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CHAPTER I:

Introduction

This research paper reviews the historical perspective on critical thinking, explains the need for critical thinking instruction and examines the literature on the impact that critical thinking has on students' learning. However, this paper will not focus on issues related to how critical thinking might be included in the curriculum, how critical thinking can be taught effectively, or how educators can implement various critical thinking programs in their classes.

Statement of the problem

Research and commentary on critical thinking have increased greatly during the last ten years. Critical thinking is widely agreed to be an important goal of education. It is closely associated with goals such rationality, autonomy, creativity and intelligence. People who think critically proceed on the basis of careful evaluation of the premises and evidence and come to a conclusion as objectively as possible by considering all relevant factors and using valid logical procedures (Good, 1973).

In the 20th century, critical thinking is seen as a characteristic of an educated person, as a condition for responsible citizenship in a democratic society, but also as an employability skills for a wide range of jobs. The ability to adapt quickly to change and the capacity to learn new skill and make sense of new information play an important role in a society dominated by an increase of knowledge and advanced technologies.

Testing student performance on assessment tasks requiring more complex thinking such as inferential reading, interpretation of data and solving problems showed unsatisfactory results. It was also noticed that students experienced difficulty with tasks which required elaboration upon and defense of their evaluations and interpretations.

The following questions will be examined in this research paper: (1) Why is there a need for critical thinking? (2) What critical thinking and what is pseudo critical thinking? (3) Does critical thinking improve students' learning?

Significance of the problem

Many educators believe that critical thinking improves students' learning and promotes intellectual growth. Critical thinking is necessary to develop a student's independent judgment that is required for self-sufficiency in adulthood. Critical thinking is central to the kind of intelligent judgment required by citizens in a democracy. In a classroom situation, through critical thinking students can take charge of their own thought processes and practice making responsible decisions about their lives with full knowledge of assumptions and the consequences of their decisions. If they can do that, they improve their ability to take charge of their own lives, improve them and bring them under their self-control.

Critical thinking and knowledge of content are woven together in the learning process. To understand the nature of knowledge, critical thinking and subject matter should be taught together. Students must be stimulated to think critically on their own to resolve dilemmas, take stands on issues, judge propositions about knowledge or ideals, etc. Teachers who model critical thinking and expressions of support for it use effective instructional behaviors. Teachers who promote and practice critical thinking in the

classroom can contribute strongly to their students' intellectual development. Teachers who ask challenging questions and require students to give evidence or reasons for their conclusions and opinions are likely to encourage their students to develop critical thinking abilities.

Definition of Terms

The following terms will be used throughout this research paper. Thinking skills is the set of basic and advanced skills that run an individual's mental processes and consist of knowledge, dispositions, and cognitive and metacognitive operations (Alvino, 1990). Metacognition means planning, assessing, and monitoring one's own thinking. Critical thinking is the process of establishing the authenticity, accuracy, and worth of information or knowledge claims (Beyer, 1985). Pseudo critical thinking occurs when a form of intellectual arrogance covered in self delusion or deception, in which thinking which is extremely flawed is presented as a model of excellence of thought (Paul, web site). Creative thinking is a novel way of seeing or doing things that is characterized by fluency, flexibility, originality, and elaboration (Alvino, 1990).

Organization of the Paper

This research paper is organized into four chapters. The first chapter introduces the topic, presents the statement of the problem and its significance, and defines terms used throughout the paper. The second chapter is a historical perspective on critical thinking and the rationale for the value of critical thinking instruction. The definitions of critical thinking and pseudo critical thinking as well as the relationship between critical

thinking and the learning process will be discussed. Chapter three analyzes the research findings related to critical thinking and its impact on students' learning. Chapter four discusses the role of critical thinking in education and examines the relationship between critical thinking skills and the content taught in schools.

CHAPTER II:

Review Of Literature

This chapter focuses on five aspects related to critical thinking. The first part offers an explanation of the need for critical thinking. The second part presents a historical background of the concept of critical thinking. The third explores what is critical thinking. The fourth one deals with the idea of pseudo critical thinking. The fifth part of this chapter investigates how critical thinking improves students' learning.

Why Critical Thinking?

Throughout history, philosophers, educators and others have been interested in reflective thinking. Some of them identify the spirit of inquiry and dialogue that was specific to the golden age of ancient Greece as the beginning of this concern and others consider it to be the Age of Enlightenment with its emphasis on progress and rationality. In the twentieth century the ability to engage in reflective thought has been seen as a main characteristic of an educated person, as a requirement for responsible citizenship in a democracy and, more recently, as an employability skill for an increasingly wide range of jobs. Deborah Gough (1991) states that "thinking skills are viewed as crucial for educated people to deal with a rapidly changing world. Many educators and researchers claim that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information" (Gough, 1991). Many instructors and researchers write about the importance of teaching students to think

critically and creatively. According to Beyth-Marom, et al. "thinking skills are necessary tools in a society characterized by rapid change, many alternatives of actions, and numerous individual and collective choices and decisions" (Cotton, 1991). Nosich (2001) claims that critical thinking is important at all levels of our thinking: the level of practical decision making, the level of meaningfulness and the level of concepts. Learning to think critically helps you see different ways to proceed, identify assumptions you may be making, anticipate the negative and positive results of your or the others' decisions and to think of effective means to achieve your goals. Also, building thinking skills opens alternative paths in one's life. It helps you develop reasonable attitudes toward self and others, toward your values and toward everything that makes your life meaningful for you. Critical thinking is important at the level of concepts because people think in terms of concepts. People become more aware of the way concepts work by examining these concepts critically. By doing so, people can reach a deep level of critical thinking. Beyer (1995) sees the teaching of critical thinking as important to the future of the United States. He argues that to live successfully in a democracy, people must be able to think critically in order to make sound decisions about personal and civic affairs. If students learn to think critically, then they can use good thinking as the guide by which they live their lives.

Why this need for teaching thinking? In Costa's Developing Minds: A Resource Book for Teaching Thinking, McTighe and Schollenberger discuss three main factors: "the characteristics of present and future societies", "students' thinking abilities" and "teaching methods." The demands for higher-order thinking in the society are increasing. The ability to adapt quickly to change and the capacity and willingness to learn new skills

on the job have great importance in a society characterized by a rapid increase of knowledge and advanced technologies. The requirements of the information age clearly effect educational goals and practices. The National Science Board Commission on Pre-College Education in Mathematics, Science, and Technology (1983) declared in its report, *Educating Americans for the 21st Century*:

> We must return to basics, but the basics of the 21st century are not only reading, writing, and arithmetic. They include communication, problem-solving skills, and scientific and technological literacy—the *thinking* tools that allow us to understand the technological world around us. . . . Development of students' capacities for problem-solving and critical thinking in all areas of learning is presented as a fundamental goal (Costa, 1991)

There are unsatisfactory results of examining student performance on assessment tasks requiring more complex thinking such as inferential reading, persuasive writing, interpretation of data and solving problems following many steps. McTighe and Schollenberger mention the analysis of trends in reading achievement made by U.S. Office of Educational Research and Improvement: "while it appears that progress has been made in raising the share of students who acquire rudimentary, basic, and intermediate reading skills and strategies, no gains are evident at the higher levels of reading ability (Costa,1991)" and the results of a National Assessment of Educational Progress in reading: "Students at all three grade levels (3, 7 and 11) have particular difficulty with tasks that require them to elaborate upon or defend their evaluations and interpretations of what they have read. Continued attention to such skills must be a major priority in instruction (Costa, 1991)."

Researchers and evaluators are concerned with the idea that teachers should stress the development of higher-order thinking skills in all areas of the curriculum. Further they should help students develop strategies for thinking about what they write, create opportunities for students to give advice, have students state their beliefs and the reasons for those beliefs, and convince others of their opinions. Teachers must also respond to the ways in which students organize and present their ideas.

McTighe and Schollenberger emphasize in their study that the way teachers teach today shows the need for teaching critical thinking (Costa,1991). They mention the research by John Goodlad whose observations showed that less than 1 percent of "teacher talk" had students engage in anything more than simple recall of information. Also many instructors consider student oral or written assignments, which are fluent and witty, as good thinking. They do not have a clear idea of what is good reasoning (Paul, 1996)

Thomson (1995) concluded that there are two reasons for teaching reasoning skills with subject matter. First, he comments on the development of clear, precise thinking skills. He refers to C.K. Ogden and I. A. Richards and their idea of meaning as a learning goal. The students need to be able "to reason clearly and precisely" so that they could "at once get from and give back to life the fullest measure of which they are capable" (Thomson, 1995). Further, he claims that to understand the nature of the knowledge is another reason for teaching reasoning skills with subject matter. Each academic discipline has a structure or nature, which is unique to that discipline. Then we should ask questions such as: What is unique about each subject? How do all these bodies of knowledge differ and how are they alike? How is each subject used?

The results of national assessments of student achievement and the education reform reports increase the awareness of our need to concentrate on the development of student thinking abilities.

Historical Background

In order to understand what critical thinking is and what its role is in improving students' learning, it is helpful to have a basic knowledge of the origins of critical thinking. Since ancient times thinkers have dealt with the idea of critical thinking and its teaching. Actually, the etymology of critical thinking goes back to the Greek word " kritike" (= the art of judgment).

Socrates is generally credited as the founder of critical thinking. Socrates' method was to ask probing questions that required a rational response. He used this method not only to question his fellow citizens but also to question authority. Socrates was a public thinker, emphasizing the need for thinking clearly and for being logically consistent. Socrates established the importance of seeking evidence, of closely examining reasoning and assumptions, of analyzing basic concepts, and of tracking down the implications of what one says and does as he spoke with his fellow citizens in the market place. To question reflectively, commonly held beliefs and explanations, carefully distinguishing those beliefs by the use of reason and logic, has become known as Socratic questioning. This method is a well-known critical thinking teaching strategy. (Paul, 1996)

According to Socrates, Plato, and Aristotle, only the trained mind is prepared to see beneath the deceptive appearances to the deeper realities of life. Critical thinking from the beginning included not only an examination of the words and actions of others

but also the examination of one's own thoughts and actions. It is in this context that we should consider Socrates statement, "The unexamined life is not worth living". Other thinkers such as Plato, Aristotle and the Greek skeptics argued that only a trained mind is prepared to see through the way things look to us on the surface, to the way they really are beneath the surface.

In the middle ages, thinkers such as Thomas Aquinas dealt with the same idea of systematic thinking. His theory of thinking was based on stating, considering, and answering all criticisms to his own ideas in a systematic way. Aquinas hoped to improve his own thinking by anticipating what his readers might argue against him and then answering those imagined criticisms. This approach to critical thinking was an important step forward.

Later, the thinkers of the Renaissance and post-Renaissance period supported their predecessors. Francis Bacon focused on the importance of studying the world empirically and on the processes of gathering information. According to Rene Descartes every part of thinking should be questioned, doubted and tested. Sir Thomas More came up with a unique way to apply critical thinking. In Utopia, he believed that established social systems were in need of radical analysis and critique. (Paul, 1996)

These are not the only names that could be mentioned when talking about the contributions to the development of the critical thought. Montesquieu, Voltaire and Diderot emphasized that only a human mind disciplined by reason could be able to understand the nature of the social and political world.

Towards the 20th century, the idea of critical thinking was extended to different domains of social, scientific, economical and political life. It produced the Declaration of Independence, Kant's Critique of Pure Reason and led to Darwin's Descent of Man.

In his writings, John Dewey continued the work of Plato and Aristotle. One of Dewey's key contributions is his focus on consequences. Critical thinking was important for Dewey because it was a method for approaching real problems in the real world and to help others predict the consequences of their actions.

A few contemporary names concerned with critical thinking are worth noting. Benjamin Bloom developed a taxonomy of cognitive skills that has been a staple of teaching for the past fifty or so years. At the beginning of the 60's, Robert H. Ennis' reawakened the American interest in critical thinking. Since the early 1980s, Richard Paul has discussed the need for critical thinking. Edward D'Angelo, Stephen P. Norris and Barry Beyer are also known for their studies regarding critical thinking. Matthew Lipman, the originator of Philosophy for Children, has introduced children from around the world (especially outside the USA) to critical thinking, logic and philosophy.

What Is Critical Thinking?

Definitions of Critical Thinking

When reading the literature on critical thinking, various definitions become apparent. There are definitions that relate critical thinking to the cognitive processes and strategies involved on problem solving, decision making or inquiry. Ennis and Norris (1989) claim that "critical thinking is reasonable, reflective thinking that is focused on deciding what to believe or do." They consider critical thinking as deciding rationally

what to or what not to believe. My interpretation of what researchers have said is that critical thinking is the formulation and use of criteria to make judgments about knowledge, methods of inquiry, policy decisions and alternative perspectives on different matters of concern. Studies in the field suggest to me that critical thinkers tend to raise and explore questions about assumptions, beliefs, claims, evidence, definitions, conclusions, and actions. In their statement for the National Council for Excellence in Critical Thinking Instruction, Scriven and Paul (1996) consider that "critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action." Elder and Paul (1994) believe that "Critical thinking is best understood as the ability of thinkers to take charge of their own thinking. This requires that they develop sound criteria and standards for analyzing and assessing their own thinking and routinely use those criteria and standards to improve its quality." A more simple definition is probably given by Beyer (1995). "Critical thinking... means making reasoned judgments". Basically, Beyer sees critical thinking as using criteria to judge the quality of something, from cooking to the conclusions reached in a research paper. In summary, I would suggest that critical thinking is a disciplined manner of thought that a person uses to assess the validity of something such as statements, news stories, arguments, and research.

Characteristics of Critical Thinking

Wade (1995) identifies 8 characteristics of critical thinking. Critical thinking involves asking questions, defining a problem, examining evidence, analyzing assumptions and biases, avoiding emotional reasoning, avoiding oversimplification, considering other interpretations, and tolerating ambiguity. Dealing with ambiguity is also seen by Strohm & Baukus (1995) as an essential part of critical thinking, "Ambiguity and doubt serve a critical-thinking function and are a necessary and even a productive part of the process." When classifying critical thinking by common traits, we find two general views: an intentional use of higher order thinking skills and metacognition. Angelo (1995) concluded, "Most formal definitions characterize critical thinking as the intentional application of rational, higher order thinking skills, such as analysis, synthesis, problem recognition and problem solving, inference, and evaluation."

Many sources identify metacognition as a characteristic of critical thinking Metacognition is thinking about one's own thinking. More specifically, "metacognition is being aware of one's thinking as one performs specific tasks and then using this awareness to control what one is doing"(Jones & Ratcliff, 1993). In his book, Critical Thinking, Beyer (1995) explains 6 essential aspects of a critical thinker:

Dispositions: Critical thinkers are skeptical, open-minded, value fair-mindedness, respect evidence and reasoning, respect clarity and precision, look at different points of view, and will change positions when reason leads them to do so

Criteria: To think critically, one must apply criteria. One needs to have conditions that must be met for something to be judged as believable. Although the argument can be made that each subject area has different criteria, some standards apply to all subjects.

"... an assertion must... be based on relevant, accurate facts; based on credible sources; precise; unbiased; free from logical fallacies; logically consistent; and strongly reasoned".

Argument: Critical thinking involves identifying, evaluating, and constructing arguments. An argument is considered to be a statement or proposition with supporting evidence.

Reasoning: Critical thinkers have the ability to infer a conclusion from one or multiple premises. To do so requires examining logical relationships among statements or data.

Point of View: In a search for understanding, critical thinkers view phenomena from many different points of view. A point of view is the way one sees the world, which shapes one's construction of meaning.

Procedures for Applying Criteria: Other types of thinking use a general procedure. Critical thinking makes use of many procedures. These procedures include asking questions, making judgments, and identifying assumptions.

In his study, Beyer clarifies the differences between critical thinking and other forms of thinking and Bloom's general list of higher-order thinking skills (inquiry, decision making, problem solving, etc.). According to Beyer, critical thinking requires a frame of mind involving attentiveness to the need to evaluate information as well as mental operations such as testing opinions and considering all positions.

Paul (1996) considers that in its ideal form, critical thinking is "based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness". Further Paul argues that critical thinking is incorporated in a set of intertwined modes of thinking such as scientific thinking, mathematical thinking, historical thinking, anthropological thinking, economic thinking, moral thinking and philosophical thinking. He also talks about two components of critical thinking. The first component is "a set of information and belief generating and processing skills". The second component is "the habit, based on intellectual commitment, of using those skills to guide behavior".

I would say that everyone can think irrationally. No one can completely be a critical thinker. The quality of thinking depends on different factors such as the quality and complexity of experience in a specific area of thinking or with respect to a particular class of questions. Many people simply follow what they consider to be an authority figure. They are not curious and they do not question or challenge authority. They do not think for themselves but they let others think for them. The development of critical thinking is an ongoing process. Individuals who think critically can ask appropriate questions and collect relevant information. They efficiently sort out this information and come to reliable conclusions about the world. They responsibly make decisions that affect their lives. For instance, critical thinkers might judge reasonably between political candidates or evaluate society's needs and then assess the candidates based on those needs. This enables them to act successfully. Critical Thinking enables individuals to be responsible citizens who contribute to society and not merely be a consumer of society's distractions

Pseudo Critical Thinking

One of the educators' goals should be to help students develop thinking skills by providing a classroom climate conducive to and supportive of thinking attributes. Some researchers and thinkers discuss in their studies the distinctions between "good thinking" and "poor thinking". Some others talk about "pseudo critical thinking". What is "good thinking"? What is "poor thinking"? What is "pseudo critical thinking"? Are the last two mentioned the same thing? Many studies have tried to define these terms. They have developed models that could help us understand the difference between these kinds of thinking. That doesn't mean that we should categorize people using this model but rather use it to concentrate on specific thinking attributes.

Allan A. Glatthorn and Jonathan Baron distinguish between good thinking and poor thinking (Costa, 1991). The authors talk about a few aspects regarding good thinking versus poor thinking: general traits, goals, possibilities and evidence. Glatthorn and Baron claim that there are a number of general traits that characterize good thinking. In their opinion, good thinkers are eager to think and even enjoy thinking. They are able to suspend judgment and search for additional information as needed. They consider that thinking is a useful tool to solve problems, make decisions and judgments. On the contrary, poor thinkers avoid thinking and need certainty. They are impulsive and must reach closure quickly relying primarily on intuition. Glatthorn and Baron make a comparison between good thinkers and poor thinkers discussing their search for goals, their search for possibilities and their search for evidence and the way they use this evidence. When good thinkers search for goals, possibilities and/or evidence they are

deliberative and take time to reflect. They are open to multiple options. In contrast, poor thinkers are impulsive and unwilling to change. They choose the first goal that comes to their mind or consider only a few possibilities.

According to Richard Paul (1996), there is a clear distinction between poor thinking and pseudo critical thinking. In his opinion, poor thinking is a result of simple ignorance. Poor thinkers make mistakes but they are not aware of making them. They would be willing to correct their mistakes if someone indicated the mistakes they would make. "Pseudo critical thinking", says Paul, "is a form of intellectual arrogance masked in self-delusion or deception, in which thinking which is deeply flawed is not only presented as a model of excellence of thought, but is also, at the same time, sophisticated enough to take many people in." This kind of thinking as a model of thought has always been present in the history of thought and knowledge.

Many pseudo critical thinking approaches refer to all judgments as being categorized in two categories: fact and opinion. Richard Paul claims that there is another category, the reasoned judgment, which is disregarded by many approaches. Facts are used in reasoning, but, in his view, good reasoning is more than stating facts and a well-reasoned position is more than simply an "opinion".

Paul clearly distinguishes three different kinds of questions when talking about critical thinking. There are questions with one right answer such as factual questions, questions with better or worse answers, that are either well reasoned or poorly reasoned answers and questions with as many answers as there are different human preferences. He concludes that pseudo critical thinking occurs when questions with better or worse answers are treated as matters of opinion. And when that happens, students uncritically

suppose that everyone's opinion has the same value. They fail to make the difference between giving justifiable reasons and evidence, when they want to support their beliefs. They get to simply assert their views on a given issue. Sometimes teachers tell students how to think and the kind of thinking they point out as a model is deeply flawed. Then that is a form of "destructive pseudo critical thinking" (Paul, 1996). Paul argues that deeply flawed thinking in teaching holds back the development of thought and knowledge in the student.

Pseudo critical thinking can be found everywhere: at different levels of society, and in the political, economical and personal domains. Rarely are there individuals who think critically and are able to analyze and assess their thinking. They believe automatically in the good quality of their thinking and in their accurate way of judging people and things. Everywhere in the world there are people who consider themselves models of good thinking and try to influence the others by their thinking.

How Critical Thinking Improves Student Learning

Examining the literature about critical thinking and its relationship to learning, one finds that critical thinking not only improves students learning but it is also considered to be essential to learning. Costa (1991) claims that "an engagement of and a transformation of the mind" is necessary for the process of learning. He argues that critical thinking reinforces patterns of thought in different content areas and also reinforces the transfer of skills across content areas. In his opinion, critical thinking skills can be strengthened by the ability to compare problem-solving experiences throughout the school day and relate the experiences throughout the school day to each other

A student-centered instructional environment that engages students in critical thought and independent action facilitates lifelong learning and will have as a result improved learning for all students (Secker & Lissitz, 1999). Student-centered instruction is characterized by inquiry and discussion of open-ended questions. Therefore, Anderson and Darling-Hammond (Secker & Lissitz, 1999) consider it effective for promoting deep understanding of science. Research shows the significance of adapting learning styles to the learner. When talking about the Learning Style Model, Dunn and Griggs (1995) conclude that students can be affected by a number of factors. One of them is processing inclination. An example is reflective inclination that can affect student' learning abilities. A student who thinks critically will spend time thinking about the information given and will better understand the content which is taught. A comprehensive model of learning can affect students' learning and the learning elements can increase academic achievement (Dunn and Dunn, 1992).

According to Richard Paul, the idea that content reflects "a mode of thinking" is necessary for designing appropriately curriculum and instruction. He considers that any content area is a manifestation of that content area thinking. For instance, the content of history is a manifestation of historical thinking. Therefore, in his view, content reflects "a way of figuring something out, a way of understanding something through thought". Paul elaborately explains this idea. He says that, "a subject is an area of study and an area of study is something that one is interested in "figuring out". (Paul, site...) Further, he explains that the "figuring out" process cannot take place without critical thinking and that to learn how to figure something out a student needs to learn how to think it through One of the examples he mentions is that an individual cannot learn historical content if

that person does not learn how to figure out correct or reasonable answers to historical questions. He concludes that any subject or content area can be understood as critical thought about a certain body of questions.

Another idea he talks about is that content has to do with concepts. He claims that in order to learn content well, one needs to learn the concepts, which define and structure it. And in order to learn a concept, a person needs to learn how to use it in thinking something through. He explains this idea saying that: "to learn a concept of democracy is to learn how to figure out whether a group is functioning democratically or not". Thus, in order to learn a body of content it is necessary to learn to think accurately and critically with the concepts that define the content (Paul, 1996). This statement is very similar to the previous definitions of critical thinking and thus to learn is to think critically about concepts and content (see Nosich, 2001, Paul, 1996).

Paul also discusses content as being "logically interdependent". He justifies his opinion arguing that it is important to understand a part of the content so that we can "figure out" its relation to other parts of the content. To learn a body of content, is to figure out (i.e., reason or think through) the connections within this thinking process." (Paul)

Richard Paul, as many other researchers, concludes that the majority of teachers and students do not consider content as a mode of thinking or as a system for/of thought. Teachers view content as a sequence of things which is usually "covered" and committed to memory (Paul, 1996). When that happens, "there is no basis for intellectual growth, there are no structures of knowledge formed, no basis for long term grasp and control.

Critical thinking, in contrast, approaches all content explicitly as thinking. It is

thinking about thinking while thinking in order to make thinking better: more clear, more accurate, more relevant, more deep, more broad, and more effective" (Paul, 1996).

"As students learn to think more critically, they become more effective readers, writers, speakers, and listeners because each ability requires well-reasoned thought"(Paul, 1993). They master the content better, because content is set in a structure of understandings which, to be comprehended, must be thought about critically (Paul same book). Self- confidence increases as students become more efficient in a variety of modes of thinking (historical, scientific, mathematical). Critical thinking produces intellectual empowerment. Students also develop skills, abilities and traits of mind such as intellectual discipline, intellectual perseverance, intellectual humility, intellectual empathy and intellectual integrity. All these are important for the success in the educational, professional, and real life.

Citron of Innovative Sciences argues that we must "systematically develop students' thinking and reasoning abilities in a 'purer' sense and directly build...transfer of these abilities to academic learning and real behavior" (Suhor, 1984). In his article, Suhor mentions that in the last few years, experts in different subjects such as mathematics, visual arts, music, and others have suggested that distinctive aspects of their disciplines involve particular mental skills, requiring adapted strategies for learning. In his view, there are thinking skills specific to any subject, but also cognitive skills found across several subjects. In academic areas such as history and literature, students must be able to infer motivation, understand sequences, and trace cause/effect relationships. Any school subject involves definitions that include classification and specification, comparison and contrast which are all elements of critical thinking

Pearson and Tierney (Suhor, 1984) see reading as an active mental process involving the construction of meaning. The NCTE "Essentials of English" statement holds that teaching of creative, logical, and critical thinking is close to the core of effective English instruction. Language as the vehicle for thinking and learning is an essential element in every classroom. Language makes critical thinking possible and critical thinking improves our use of language in every subject area.

According to Nosich (2001), a piece of reasoning is "to make judgments about how reasonable it is; it is to assess how well it lives up to critical thinking standards". Discussing the evaluation of a piece of reasoning he comes up with a series of questions that can help in the improvement of student learning.

1. Does this person achieve his or her purpose in this piece of reasoning?

2. Does this person adequately answer the question at issue?

3. Look at the major pieces of information the person provides. Are they reasonable? Well-established? Are they on the whole true? Is more information needed to resolve the question at issue?

4. Do the person's conclusions follow from his or her reasoning? Is the person interpreting the issue accurately?

5. Are there other valid ways of understanding the central concepts, ways that would influence the outcome of the reasoning?

6. Are the person's major assumptions reasonable enough for you to agree with them?

7. Are the implications of the person's reasoning acceptable? Will the person's reasoning lead to other consequences, ones that would count for or against his or her reasoning?

8. Is the person aware of other reasonable points of view on this issue? Has he or she taken them adequately into account?

9. Does the person reason thrōugh the issue in a way that takes sufficient account of the context?

10. Are there better alternatives to the way the person has reasoned this out?

These ten show another way of saying "critical thought". It is also shown that instruction in critical thinking promotes intellectual growth and fosters academic achievement.

In their study, Nickerson, Perkins, Smith (1985) emphasize that teaching of thinking is compared with the teaching of straight subject matter, thinking abilities and domain-specific knowledge being considered contrasting educational goals. Critical thinking cannot replace knowledge and knowledge cannot replace critical thinking. Knowledge and critical thinking are two sides of the same coin. Both of them are equally important (Nickerson et al.). Richard Paul also suggests that for many people there is no clear distinction between knowledge and thinking. In his view, " knowledge is produced by thought, analyzed by thought, comprehended by thought, organized, maintained, and transformed by thought". He claims "knowledge is acquired only through thought". The

author relates "the achievement of knowledge" with "the development of intellectual discipline and intellectual values".

Many studies emphasize that educators should prepare students to be independent-minded, engage them in metacognition and have them exhibit various creative competencies that develop their critical thinking abilities. There are experts who consider critical thinking coming after knowing a lot of facts. Hirsch (1998) argues that a highly intellectual competence can be developed through knowledge. Knowledge makes learning and thinking possible. Knowledge can make you better able to learn new things and better able to think critically. This reinforces the interdependence of knowledge and critical thought.

In summary these studies have shown that critical thinking improves students learning but perhaps more importantly that critical thinking and knowledge are woven together in the learning process (Nickerson et al.,1985, Thomson, 1995, Paul, 1996).

CHAPTER III:

Summary of Findings

Researchers emphasize the idea that critical thinking promotes intellectual growth and fosters academic achievement. Therefore educators are interested in knowing more about critical thinking and methods they could use to teach it to their students. Academic departments hope that its professors will become informed about the strategy of teaching critical thinking skills. One of their objectives is to emphasize and teach critical thinking and to develop and use problems in exams that test students' critical thinking skills. Critical thinking is considered to improve students' learning. But what else does the research show? What other ideas have surfaced as important when discussing critical thinking and learning?

In the 20th century, being able to engage in critical thought is seen as a feature of an educated person, as a requirement for responsible citizenship in a democracy and as an employability skill for a wide variety of jobs. An ability to learn and make sense of new information, critical thinking is considered to be important at all levels of our thinking: the level of practical decision making, the level of meaningfulness and the level of concepts.

Many studies were concerned with the idea that teachers should concentrate more on the development of higher-order thinking skills in **all areas of the curriculum**, have students develop strategies for thinking about their assignments, build situations for students to share their opinions and their reasoning for those opinions and respond to the ways they organize and communicate their ideas. This was more than just critical

thinking, it was combining critical thinking with content and then using them to help improve students learning.

The combination of critical thinking and knowledge of content are essential to learning. In order to understand the nature of knowledge critical thinking skills should be taught **with** subject matter. Being able to compare and relate problem-solving experiences in different content areas can reinforce critical thinking and improve the learning of content. Studies claim that critical thinking strengthens patterns of thought in content areas and the transfer of skills across these areas.

In 1980, the Venezuelan government, requesting the assistance of Harvard University, initiated a program on how to teach cognitive skills that apply to learning and intellectual performance, stressing observation and classification, deductive and inductive reasoning, hypothesis generation and testing, critical use of language, problem-solving, inventiveness, and decision making (Hernstein, R.J., Nickerson R.S., Sanchez, M & Swets, J.A.,1986). They developed a course including pretests and posttests. The course was taught experimentally to over 400 Venezuelan seventh graders, from economically and educationally deprived backgrounds and whose classes were matched to those of a control group. The lessons were based on perceptual and verbal reasoning, verbal analogies, and reading comprehension as well as on more pragmatic concerns such as problem-solving, decision-making and inventive thinking. From direct observation the lessons created a new, dynamic interaction between teacher and student. Feedback from students and active involvement with the flow of material characterized the classroom. An analysis of data shows that the course had statistically reliable and substantial effects on the students. Standardized and content specific objective tests as well as various

subjective tests indicated that the course had sizable, beneficial effects on its students and their academic achievement.

In 1999, Von Secker and Lissitz developed a study on the impact of instructional practices recommended by the National Science Education Standards on individual achievement. The pedagogical reforms, laboratory inquiry and an increased emphasis on critical thinking were expected to account for some of the variability in school mean achievement. The study was based on the assumption that changing the way science is taught will result in higher average achievement for students in this content area. The NSES argue that learning occurs when students have the opportunity to build understanding through empirical investigation and social interaction with others. They also consider that having students understand scientific knowledge is an important goal of teaching science. In order to achieve this aim, teachers should focus more on individual inquiry and group interaction. A main idea of the study is that knowledge is not transmitted directly from one person to another, but the learner actively constructs it. A teacher's role is to provide opportunities for active investigation and to serve as a facilitator of student reflection and critical thinking.

Lissitz and Von Secker selected for their analysis a sample of 2,018 tenth-grade students in 163 schools based on the availability of four measures: science achievement data, student demographic data, science teacher questionnaire data and at least four students per school. One of the composite variables they created was critical thinking. They considered it to reflect the amount of emphasis teachers place on habits of mind associated with scientific literacy, such as student understanding and application of

scientific knowledge, ideas, and inquiry processes, and emphasis on scientific writing and advanced study.

Their composite variables did not explain significant differences in student achievement in science. What the investigators discover was that laboratory inquiry and critical thinking will not necessarily result in more learning unless students also have instruction in content represented by the basic vocabulary and scientific understanding essential for engaging in meaningful individual investigation and collaborative discussion.

CHAPTER IV:

Conclusions and Implications

The research studies presented show that critical thinking improves students' learning but probably more significantly that critical thinking and knowledge are woven together in the learning process. Sometimes the teaching of thinking is contrasted with the teaching of conventional matter. Thinking ability and knowledge are viewed as opposing educational goals. But they cannot substitute for each other. They are both essential to the learning process. Knowledge and thinking are the yin and yang of the intellectual competence and rational behavior (Nickerson, Perkins & Smith, 1985).

Critical Thinking comes after knowing a lot of facts. It is considered to be highly skilled intellectual competence (Hirsch, 1998). When talking about what human beings do when they behave intelligently, Costa (1988) mentions that they show flexibility in thinking, metacognition, checking for accuracy and precision, questioning and problem posing, **drawing on past knowledge** and applying it to new situations and precision of language and thought. There are also school and classroom conditions that can develop these traits of intelligent behavior: students must realize that critical thinking is a goal; the teacher should present challenging problem-solving opportunities, a rich responsive environment and model critical thinking before and with the students. The teacher's own display of desirable intelligent behavior in the presence of students plays an important role in the students acquisition of this skill. The teacher must build an intellectually rigorous atmosphere As Richard Paul concludes in his interview for Think magazine (1992), students need to see the teacher's mind at work, stimulating theirs with questions

that explore **information and experience**, questions that require evidence and reasons, questions that guide students in investigating interpretations and conclusions and discovering their assumptions. The teacher needs to challenge students' ideas, encourage them to follow out the implications of their reasoning and have them test their ideas.

According to Paul,(1996) " critical thinking is the practice of processing **information** in the most skillful, accurate, and rigorous manner possible, in such a way that it leads to the most reliable, logical, and trustworthy conclusions, upon which one can make responsible decisions about one's life, behavior, and actions with full knowledge of assumptions and consequences of those decisions."

There is some data that shows the impact of critical thinking on the students' learning improvement, but there is more evidence that instruction in critical thinking skills promotes intellectual growth. Many researchers and evaluators concluded that critical thinking programs have long-term effects on the students. Critical thinking is especially important in establishing and maintaining a positive, stimulating classroom climate for instruction, so that students will feel free to experiment with new ideas and approaches.

Students, in general, do not have well developed critical thinking skills. Although many people once believed that we were born either with or without creative and critical thinking abilities, research has shown that these skills are teachable and learnable. Critical thinking skills are necessary in a rapidly changing, technologically oriented world.

Critical Thinking skills and their relationship to the content of our typical school curriculum needs further investigation. We need to understand how best to teach critical thinking. We need to understand which content best matches with instruction in critical thinking. We need to know what student characteristics need to be accounted for when we select content and structure for instruction in critical thinking.

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✓ Satisfactorily completed the comprehensive oral examination.

___ Did not satisfactorily complete the comprehensive oral examination.

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On

August, 27, 2001

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